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ABSTRACT

The Technology mentor Fellowship Program (TMFP) matched technologically proficient preservice teachers with K-12 teachers and university faculty to model technology as an instructional tool in K-12 classrooms and college classes. A consortium consisting of seven participating independent school districts and Texas A&M University designed an innovative approach for integrating technology into teacher preparation programs that allowed over 5,000 minority, language-minority, and children of poverty to access teachers who are prepared to teach in their increasingly high-tech classrooms. Over the course of the project, 450 undergraduate students were employed to fill 628 Technology Fellow placements. Placements were made each semester and many students were employed as Technology Fellows for multiple semesters. Similarly, 279 teacher educators (46 campus-based and 233 school-based) worked with the 450 employed Technology Fellows across the project. These participants have collaboratively developed 1,043 learning objects across a wide range of content areas for learners from kindergarten through graduate school. (Author/MES)

Technology Professional Development of Teacher Education Faculty by Net Generation Mentors

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Abstract

The Technology Mentor Fellowship Program (TMFP) matched technologically-proficient pre-service teachers with K-12 teachers and University faculty to model technology as an instructional tool in K-12 classrooms and college classes. A consortium consisting of seven participating independent school districts and Texas A&M University (TAMU) designed an innovative approach for integrating technology into teacher preparation programs that allowed over 5,000 minority, language-minority, and children of poverty to access teachers who are prepared to teach in their increasingly high-tech classrooms. Over the course of this project, 450 undergraduate students were employed to fill 628 Technology Fellow placements. Placements were made each semester and many students were employed as Technology Fellows for multiple semesters. Similarly, 279 teacher educators (46 campus-based and 233 school-based) worked with the 450 employed Technology Fellows across the project summing to a total of 729 participants. These participants have collaboratively developed 1043 learning objects across a wide range of content areas for learners from kindergarten through graduate school.

Technology Professional Development of Teacher Education Faculty by Net Generation Mentors

Statement of Problem: As a beginning step in gaining an understanding of the nature of technology integration in Colleges of Education a needs sensing activity, a survey entitled, Technology and the Pre-service Teacher Education Program: A Survey of Colleges, Schools, and Departments of Education, [available at http://eeducation.tamu.edu/ihe/allstates-1.html] was conducted at all public and private teacher education programs at institutions of higher education in Texas to: (1) determine how and to what degree instructional technology was being incorporated into teacher preparation; and (2) determine the status of technology support to faculty and students provided by institutions of higher education. A second survey and needs sensing activity the, Levels and Use of Technology in Texas Public Schools: 1998 Survey (Denton, Davis, Strader, Jessup and Jolly, 1999) was completed to determine the changes in Texas public schools regarding technology infrastructure, financial support for this infrastructure, staff development related to technology, and use of the technology infrastructure. Both surveys were then compared to see if Colleges of Education in Texas were indeed keeping pace with the advances in technology occurring in K-12 schools and whether teacher preparation programs were providing the necessary pre-service experiences in technology to teachers entering the profession.

Colleges of Education (COEs) Needs Scan

The survey entitled, Technology and the Pre-service Teacher Education Program: A Survey of Colleges, Schools, and Departments of Education was distributed to all deans of the Colleges of Education across a five-state region (Kansas, Missouri, Nebraska, Oklahoma, and Texas). For purposes of this needs sensing activity, Texas data were extracted from the group data of the other four states. Responses from the Texas sample occurred from small private institutions of higher education to large state sponsored institutions of higher education and included both public and private institutions. Continuing data collecting activities occurred until a 60% response ratio was attained.

Interpretation of the collected data revealed that Texas College of Education administrators saw an increased level of support for technology but many still felt that support for technology in their college was meager at best. For example, one COE administrator saw the installation of computer labs for faculty use as support while another COE administrator whose college was already equipped with computer labs saw technical assistance and training given to faculty as increased support. Access to and use of the Internet by both faculty and students, along with administrative support and encouragement for the use of technology were rated as adequate but not highly satisfactory.

Colleges of Education administrators were also asked about technology skills considered to be important for teaching candidates and were asked their perception of the adequacy of general skills training currently received by their pre-service teachers. The respondents felt that pre-service teacher skills were currently adequate regarding candidates' ability to operate a computer system, to use software and tools that were directly related to their own professional use (such as, productivity tools - databases, word processing, and spreadsheets). Respondents reported that pre-service teachers were just beginning to use multimedia in projects although, for the most part, they were not required to do so. They (pre-service teachers) seemed to possess the skills to produce multi media projects with little assistance provided by the faculty.

In response to questions regarding faculty members using certain hardware and software technologies, the majority of responses indicated a low level of use by faculty. The exceptions to this were in the instructional use of the VCR and the use of word processing, spreadsheets and presentation software. Respondents felt that web-based technology and programs had been around long enough for faculty to develop a verbal knowledge but they had not been given support to apply these technologies in their classes. Pre-service teachers were not required by the faculty to use technology in their teacher preparation programs but many of these pre-service teachers actually had the skills to use advanced technologies and software and many times did so without being required to do so. Integrating these findings with the extant literature, it seems that faculties have found that the first wave of what we call the "Net Generation"(first wave being ages 18-22 years of age) feel much more comfortable with the new technologies and take the initiative to use the technologies without much prodding (Tapscott, 1997). Pre-service teachers now in our Colleges of Education are now made up of predominately the Net Generation (sometimes called Generation Y). The Net Generation, having grown up with the new technologies, is entering our institutions of higher education with a much better comfort level for technology than the existing university faculty who grew up with television and radio. Consequently an "Intergenerational Digital Divide" exists.

Technology in Texas Public Schools - 1998 Survey

This state-wide survey was based on the hypothesis that federal and state funding had affected technology infrastructure of school districts through nearly 1000 grants awarded to Texas public schools between 1996 and 1998. All 1043 school districts in Texas were invited to participate in this survey by completing the survey online or completing a mark-sense instrument and remitting it by mail. At the close of data collection, 789 surveys were submitted by 75.6 percent of the state's public school districts. Key findings from this survey included:

- Computer to student ratios of 1:5 and 1:10 were cited most often.
- T-1 connections were the most common Internet connection to school districts.
- The modal value of computers per classroom was one with many of these having an Internet connection.
- Ninety-one percent of the districts reported having connectivity to the Internet.

In addition to the increasing presence of technology hardware in schools, professional development opportunities increased dramatically from 1996 to 1998. Topics that received much attention in Texas schools were Internet applications and in-depth instruction on software applications and content-focused applications for classroom instruction. In addition, a modest percent of responses (20 percent) indicated that their teachers and students were beginning to access the Internet in class. The findings from the total survey indicated that both teachers and their students were in the initial stages of employing technology at the instructional level in 1998, but with equipment in place and professional development opportunities expanding, much expansion of Internet-aided class instruction was expected. At the time these surveys were conducted a majority of teacher preparation faculty in the College of Education at Texas A&M University was not integrating technology into the restructured field-based teacher preparation programs, nor were they encouraging their teaching candidates to become proficient with technology applications for the classroom.

Given the findings from these surveys, the research team identified the following needs to be addressed by this project:

- *development of faculty in the TAMU College of Education to be proficient in the use of various instructional and communications technologies;*
- *development of capacity within the TAMU College of Education in digital media that supports the National Council for the Accreditation of Teacher Education (NCATE) standards and the International Society for Technology in Education (ISTE); and*
- development of support to faculty transitioning to new teaching preparation programs by supporting their technology infusion efforts into the curricula.

Given the needs that lead to the Technology Mentor Fellowship Program, the following research questions were phrased to guide this inquiry based on the preceding identified needs.

1. **Can a mentoring program be implemented for college faculty to become proficient in the use of various instructional and communications technologies?**

2. **Can a mentoring program be developed to support faculty with integrating technology into a new teacher preparation curriculum?**

Background

Net Generation: The baby boom generation is being eclipsed by the Net Generation (currently ages 20-birth). The Net Generation currently represents 30 percent of the population as compared to the boomers' 29 percent making it the one generation in a long time large enough to rival the boomers and their culture. What makes the Net Generation unique? What makes it such a dominant force in our culture? It is not Net Generations' size but their growing up during the dawn of a new interactive medium of communication. Although their parents (predominately boomers) may have spent their formative years around television, this medium was much more limited than the medium that the Net Generation is engaging during its formative years. The context and environment are fundamentally different from those of their parents and for sure the experiences of their grandparents. Keeping abreast of changes and expectations is increasingly difficult as organizations and individuals become digitally enabled (Milliron & Miles, 2000).

Net Generation members have become the new youth wave given the large numbers in which "Net Geners" are being born. This wave of youth coincides with the digital revolution that has transformed all corners of our society. Together these two factors have produced a generation that is not just a demographic bulge but also a wave of social change and transformation (Tapscott, 1997). Net Geners have grown up in households with the greatest penetration of digital media, as the penetration of digital media has always been greater in houses with children. And during the Net Generations' stay interactive technology has begun to really pour into the schools with an impressive 82 percent of all children today having used a computer (Tapscott, 1997).

Some analysts predict a raging war between the generations brought on by the new technologies. But many of us see ways to pair the generations together to get the most benefit for all involved. This project had as its roots the assumption the Net Generation would assist other generations in learning new ways to use the technology in a system that has been stubborn to change and steeped in the tradition of doing things the same as always...institutions of higher education. However our institutions of higher education must change as they are experiencing, right now, the first wave of the Net Generation.

Procedures

Recruitment of Teacher Education Faculty and Technology Fellows: Extensive processes were developed for recruiting, providing continuous technology skill training, and monitoring the work of technology undergraduate fellows with university and public school teacher education faculty. These processes were essential because the key strategy was to match technologically-proficient pre-service teachers with K-12 teachers and University faculty to model technology as an instructional tool in K-12 classrooms and college classrooms.

Teacher education faculty, defined as campus-based faculty as well as classroom teachers who supervise student teachers and other field experiences of teaching candidates were recruited to participate in the project during the preparation of the application. Fortunately, this process was an "easy sell" with the recruitment of classroom teachers being coordinated through district technology directors who worked with building principals. As the project continued, demand for Technology Fellows outstripped the resources to provide additional fellows. Campus-based faculty members were recruited through personal visits and presentations at faculty meetings of the teacher education faculty by TMFP staff. Additional recruiting support was garnered as other college department heads encouraged their faculty who taught teacher preparation classes to participate in the program. While not every campus-based faculty member who worked with teacher preparation candidates chose to participate in this program, the response to the program was within the range of what was planned when the project application was developed.

Undergraduate technology mentors were initially recruited from the undergraduate classes of educational technology students who were also teacher preparation students. TMFP staff visited each class to explain the project and benefits for participating as a technology fellow, such as,

- paid training ($7.50/hr for 20 hrs of training) to work as technology mentors using web resources, Microsoft production tools and instruction on communication skills before beginning their experience with faculty partners;
- a paid field experience ($7.50/hr for 10 clock hours per week) with an opportunity to continue across ensuing semesters;
- working with an experienced teacher or faculty member on an individual basis to learn about pedagogy and their personal views about teaching; and

- providing technology support to faculty member in integrating technology into their instruction.

This recruitment strategy resulted in approximately 70 percent of the expected number of Technology Fellows during the first semester of the project. This strategy was then expanded to all teacher preparation classes during the second semester of the project with disappointing results. Strategies to advertise over a local radio station and in the campus paper at the beginning of the semester for Technology Fellows produced telling results. The radio adds produced very modest returns for the cost, but the campus paper add resulted in doubling the number of Technology Fellows within a three week period. This strategy was used throughout the remaining semesters of the project with much success.

Faculty Orientation and Technology Mentor Training: A training schedule consistent with suggestions in the literature (Clark & Denton 1998; Loucks-Horsley, Hewson, Love & Stiles, 1998) was developed and implemented with participating faculty members and the Technology Fellows that included the following components.

Role of Faculty in TMFP Program – the following tasks were suggested to faculty members agreeing to work with Technology Fellows by TMFP project staff as a beginning point in the just-in-time technology professional development experience.

First month

- Meet face-to-face with Technology Fellow at school or departmental meeting.
- In initial session with Technology Fellow complete Profiler and suggest possible projects. Review project files available in management system for ideas.
- Establish a calendar for meeting and outline tasks/projects/due dates for the next two months or remaining weeks in the semester.
- Contact TMFP staff if assignment will not work due to scheduling or other reasons.

Second and third months of semester

- Begin with a project such as a web-page with Tech Fellow (if you do not have a web-page) and/or a Track from TrackStar.
- Plan to develop two or three projects during the coming 6 to 8 weeks in the semester.
- Approve weekly reports on electronic management system.
- Meet weekly with Technology Fellow to share work on projects and discuss ideas to complete the projects.

Fourth through eighth months of project

- Take stock of projects completed and needs for integrating technology into courses.
- Participate in Spring Semester seminar with Technology Fellow on progress and future steps.
- Develop a project calendar for the Spring Semester.
- Continue approving weekly reports on electronic management system.
- Complete end-of-year Profiler.

It has been satisfying to confirm that these timeline activities for the Technology Fellows and teacher education faculty are consistent with the results of a large-scale empirical examination of professional development experiences. These Investigators have reported that professional development experiences that emphasize academic subject matter (content), provide opportunities for "hands-on" activities (active learning), are integrated with ongoing classroom operations (coherence), and occur for an extended period of time with many development experiences are more likely to produce desired knowledge and skill changes (Garet, Porter, Desimone, Birman & Yoon, 2001).

Continuing Professional Development of Technology Fellows: Initial training and continuing training were provided to Technology Fellows in the TMFP laboratory containing twenty workstations equipped with Dreamweaver 3.0, and Microsoft Office Suite. The laboratory was open from 8:00 AM to 5:00 PM Monday through Friday for Technology Fellows' skill updating and their use in developing projects for their faculty partners. During year 2 of the project, project staff began developing and implementing online professional development lessons for new Technology Fellows that effectively reduced face-to-face training sessions from 20 hours to 2 hours, with the remaining training being provided through online lessons. Formative evaluation of the training experiences (by staff and the project's external evaluators) indicated the online lessons were very effective training tools. The second year of the project also marked the beginning of Intel training for all Technology Fellows by a project staff member. The Intel curriculum was provided in addition to the initial training experiences that were used when the project began. An **Electronic Management System** was developed to track the Technology Fellow assignments, to provide work schedule targets, to provide payroll information, to serve as a repository for electronic learning objects developed by the Faculty-Technology Fellow teams, and to serve as an online communication system for the Technology Fellows, the Project Coordinator, and the Faculty members who worked with the Technology Fellows. The management system utilizes the Internet to address challenges associated with multiple levels of communications, project management and monitoring of electronic instructional object development.

Findings

The methods of evaluation included the use of objective performance measures that were clearly related to the TMFP objectives and have produced quantitative and qualitative data.

At the conclusion of each semester, <u>on-campus faculty</u> completed an on-line, ten item questionnaire to reflect their perceptions about their experiences in the project ranging from 1 (strongly disagree) to 5 (strongly agree). The ten items provided formative data to project staff about daily operations and curricula offered by the project. The following statements provide brief summaries across items on this questionnaire.

1TE. Overall, participating in this project was beneficial to me. The ratings ranged from **3.83 to 5.00** across semesters with higher ratings occurring during the final project year.

2TE. The project seemed well organized. The ratings ranged from **3.94 to 4.75** across semesters with higher ratings occurring during the final project year.

3TE. The project is focused on important needs and activities. The ratings ranged from **4.29 to 4.86** across semesters with higher ratings occurring during the final project year.

4TE. The project provided a support network of online resources and personal assistance. The ratings ranged from **3.54 to 4.33** across semesters with higher ratings occurring during the final project year.
5TE. The activities and strategies in the project facilitated my learning. The ratings ranged from **3.94 to 4.57** across semesters with higher ratings occurring during the final project year.
6TE. The project was an important resource for me. The ratings ranged from **4.00 to 4.88** across semesters with higher ratings occurring during the final project year.
7TE. The project helped me to learn important skills and knowledge. The ratings ranged from **3.80 to 4.50** across semesters with higher ratings occurring during the final project year.
8TE. This project has or will impact my work in the classroom. The ratings ranged from **4.30 to 4.67** across semesters with higher ratings occurring during the final project year.
9TE. This project has or will assist me in helping others use technology. The ratings ranged from **3.75 to 4.44** across semesters with higher ratings occurring during the final project year.
10TE. This project has or will assist me in helping others integrate technology into the curriculum, after-school or community program. The ratings ranged from **3.86 to 4.50** across semesters with the lowest and highest ratings occurring during the final project year.

Additional On-campus faculty perceptions of the program were collected by our external evaluators as they conducted end of year interviews. The following responses were gleaned from participating faculty during year 3 of the project.

"My technology fellow has assisted with web-site development and administering (an) on-line course to students through TTVN and on-campus."

"Have a better understanding of how advanced in technology our pre-service teachers are, which helps me design class activities that can better meet my students' needs in class."

"The students have been very helpful in moving my projects forward."

"Resources and person power to get many tasks completed well and on time."

"Development and production of a WebCT course, a personal web page, and several PowerPoint presentations."

Conclusions

The preceding data and deliverables associated with the TMFP were organized into the following research question summaries.

Research Question 1: Can a mentoring program be implemented for college faculty to become proficient in the use of various instructional and communications technologies?

Benchmark Assumption: Participation of 20 campus based teacher educators and 100-120 classroom based teacher educators.
Outcome: Across the second year of the project, the Technology Fellow placements numbered 137 during the fall semester and 156 during the following spring semester. Thirty-eight (38) campus–based faculty and 99 school-based educators assignments occurred during the fall semester of year 2. During the following spring semester, 57 campus-based faculty and 99 school-based faculty assignments occurred. The increased number of campus-based assignments was due to multiple Fellows being assigned to campus-based faculty working with a smart cart at one of the field sites. During year 3, the Technology Fellow placements numbered 132 during the fall semester and 130 during the spring semester with 1/5 of the Technology Fellows being assigned to campus-based faculty. Across the grant 46 different campus-based faculty and 233 different school-based faculty participated in this program. Given the benchmarks stated, **research question 1 can be answered in the affirmative**.
Analysis and Interpretations: After we adjusted the recruitment process and increased the orientation activities of Technology Fellows and teacher education faculty, the process has continued to become more efficient and effective. Second, turnover among Technology Fellows diminished between the Fall and Spring Semesters during year 3. We think a key reason for this stability of Technology Fellow placements is the addition of on-line resources provided through the eEmpowerment Zone, a professional development portal for pre-service and in-service educators. End-of-year surveys and interviews conducted during the spring semester 2002 support our hypothesis about the stability of placements and the functioning of the program. Given feedback during year 1 of the grant regarding the lack of clear expectations for both teacher education faculty and the Technology Fellows, the staff directed much attention to establishing clear directions and providing more extensive training for the Technology Fellows. As time passed, 20 hours of repetitive face-to-face small classes with beginning Technology Fellows were replaced with carefully designed on-line tutorial lessons and 2 hours of face-to-face meetings on technology skills needed for technology enhanced instruction. These on-line lessons are now offered through the eEmpowerment Zone and are available for pre-service and in-service teachers now the grant has concluded.

Research Question 2. Can a mentoring program be developed to support faculty with integrating technology into a new teacher preparation curriculum?
Benchmark Assumption: All Teacher education Faculty-Technology Fellow teams will produce one digital instructional object per team for at least one course per semester. Benchmark for Year 2 = 293 digital instructional objects; Benchmark for Year 3 = 266 digital instructional objects.
Outcome: A large number of electronic objects (1,043) have been created across a wide range of content areas. Digital resources have been developed for mathematics, science, social studies, language arts, history, English, ESL, teacher education, technology, reading, graphics design, fine arts, economics, physical education, special education, French, agriculture, business education and engineering) for the continuum of learners from kindergarten through graduate school. Given the benchmarks stated, **research question 2 can be answered in the affirmative**.

Analysis and Interpretations: The large number of electronic resources developed across the project suggests faculty have begun to integrate electronic learning objects in their instruction. Yet faculty members often need help in identifying quality web resources for their classes. In response, Technology Fairs and Technology Workshops were held during year 2 and demonstrations of the *i-Folio* system occurred during year 3 to introduce teacher education faculty to an array of technology resources. The idea that we must keep in mind is that substantial interest was exhibited by faculty members during this project to integrate technology into their courses, and continuing support and suggestions will keep them expanding their technology skills and increasing their electronic resources.

Discussion

Teacher education faculty are willing to engage in technology professional development experiences delivered by a technology fellow (undergraduate student) if the professional development activities are tailored to the faculty member's individual needs and project assignments and arranged to fit her time schedule. The key to a successful professional development experience is to establish a dyad (faculty member and technology fellow) that opens communication channels quickly with the dyad members establishing regular meeting times to collaborate and share ideas, techniques and project products. As technology knowledge and skills grow among faculty members, the issue of encouraging teaching candidates to integrate technology into their class activities will occur through modeling what they have experienced in their classes.

Professional development opportunities for technology integration will be continued on an individual basis, especially since the annual faculty evaluation system now includes technology integration among the evaluation categories for a faculty member's annual performance review. In addition, a requirement for employment in teacher education has been instituted that all future teacher education faculty members must be proficient technology practitioners in their teacher preparation classes, and when employed the new faculty member will be informed that they will be evaluated on their proficiency and use of technology.

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